

CLAIM STATUS

1. (Currently Amended) A method for distinguishing between sources of process variation, comprising:

processing a plurality of manufactured items in a process flow;

storing a set of production environment data associated with each of the manufactured items;

identifying manufactured items associated with a process drift;

generating a plurality of characteristic threads based on the production environment data,
at least one of the characteristic threads being associated with other than
processing tools used in the process flow;

comparing the characteristic threads for at least those manufactured items associated with the process drift; and

determining at least one potential cause for the process drift based on the comparison of the characteristic threads.

AN
2. (Original) The method of claim 1, further comprising grouping the characteristic threads into characteristic categories.

3. (Currently Amended) A method for distinguishing between sources of process variation, comprising: ~~The method of claim 2, wherein comparing the characteristic threads comprises~~

processing a plurality of manufactured items in a process flow;

storing a set of production environment data associated with the manufactured items;
identifying manufactured items associated with a process drift;
generating a plurality of characteristic threads based on the production environment data;
grouping the characteristic threads into characteristic categories;
comparing the characteristic threads in a particular characteristic category for all of the
manufactured items to the characteristic threads in the particular characteristic
category for the manufactured items associated with the process drift; and
determining at least one potential cause for the process drift based on the comparison of
the characteristic threads.

M X (r)
4. (Original) The method of claim 3, further comprising calculating a plurality of characteristic thread ratios, wherein each characteristic thread ratio comprises the ratio of manufactured items in the characteristic thread associated with the process drift to a total number of manufactured items in the characteristic thread.

5. (Original) The method of claim 4, wherein determining the at least one potential cause for the process drift comprises identifying a particular characteristic thread ratio in one characteristic category that differs from other characteristics thread ratios in the same characteristic category.

6. (Original) The method of claim 1, wherein processing the plurality of manufactured items in the process flow comprises processing a plurality of semiconductor wafers in a semiconductor device manufacturing process flow.

7. (Original) The method of claim 6, wherein processing the plurality of semiconductor wafers comprises processing the plurality of semiconductor wafers grouped into lots of wafers, and identifying the manufactured items associated with the process drift comprises identifying particular lots of wafers associated with the process drift.

8. (Currently Amended) A method for distinguishing between sources of process variation, comprising: The method of claim 6, wherein

processing a plurality of semiconductor wafers in a semiconductor device manufacturing process flow;

storing a set of production environment data associated with the semiconductor wafers;

identifying semiconductor wafers associated with a process drift;

generating [[the]] a plurality of characteristic threads comprises based on the production environment data comprises including generating characteristic threads for processing tools in the process flow;

comparing the characteristic threads for at least those semiconductor wafers associated with the process drift; and

determining at least one potential cause for the process drift based on the comparison of the characteristic threads.

9. (Currently Amended) The method of claim 6, wherein generating the plurality of characteristic threads comprises based on the production environment data comprises generating characteristic threads for metrology tools used to measure characteristics of semiconductor wafers in the process flow.

10. (Currently Amended) The method of claim 6, wherein generating the plurality of characteristic threads comprises based on the production environment data comprises generating characteristic threads based on incoming characteristics of semiconductor wafers in the process flow.

11. (Currently Amended) The method of claim 6, wherein generating the plurality of characteristic threads comprises based on the production environment data comprises generating characteristic threads based on operating recipe parameters used for processing semiconductor wafers in the process flow.

12. (Currently Amended) A manufacturing system, comprising:

a plurality of tools for processing manufactured items in a process flow;

a database server adapted to store a set of production environment data associated with

~~each~~ of the manufactured items; and

a drift monitor adapted to identify manufactured items associated with a process drift,

generate a plurality of characteristic threads based on the production environment data, at least one of the characteristic threads being associated with other than processing tools used in the process flow, compare the characteristic threads for at

least those manufactured items associated with the process drift, and determine at least one potential cause for the process drift based on the comparison of the characteristic threads.

13. (Original) The manufacturing system of claim 12, wherein the drift monitor is adapted to group the characteristic threads into characteristic categories.

*AN X
CR*

14. (Currently Amended) A manufacturing system, comprising: The manufacturing system of claim 13, wherein the drift monitor is adapted to
a plurality of tools for processing manufactured items in a process flow;
a database server adapted to store a set of production environment data associated with
the manufactured items; and
a drift monitor adapted to identify manufactured items associated with a process drift,
generate a plurality of characteristic threads based on the production environment
data, group the characteristic threads into characteristic categories, compare the
characteristic threads in a particular characteristic category for all of the
manufactured items to the characteristic threads in the particular characteristic
category for the manufactured items associated with the process drift, and
determine at least one potential cause for the process drift based on the
comparison of the characteristic threads.

15. (Original) The manufacturing system of claim 14, wherein the drift monitor is adapted to calculate a plurality of characteristic thread ratios, wherein each characteristic thread ratio comprises the ratio of manufactured items in the characteristic thread associated with the process drift to a total number of manufactured items in the characteristic thread.

16. (Original) The manufacturing system of claim 15, wherein the drift monitor is adapted to identify a particular characteristic thread ratio in one characteristic category that differs from other characteristics thread ratios in the same characteristic category as the at least one potential cause for the process drift.

AV X CM

17. (Original) The manufacturing system of claim 12, wherein the manufactured items comprise semiconductor wafers processed in a semiconductor device manufacturing process flow.

18. (Original) The manufacturing system of claim 17, wherein the semiconductor wafers are grouped into lots of wafers, and the drift monitor is adapted to and identify particular lots of wafers associated with the process drift.

19. (Currently Amended) A manufacturing system, comprising: ~~The manufacturing system of claim 17, wherein the drift monitor is adapted to generate a plurality of tools for processing semiconductor wafers in a semiconductor device manufacturing process flow;~~

a database server adapted to store a set of production environment data associated with the semiconductor wafers; and

a drift monitor adapted to identify semiconductor wafers associated with a process drift, generate a plurality of characteristic threads based on the production environment data including characteristic threads for processing tools in the process flow, compare the characteristic threads for at least those semiconductor wafers associated with the process drift, and determine at least one potential cause for the process drift based on the comparison of the characteristic threads.

ANX (r)

20. (Original) The manufacturing system of claim 17, wherein the drift monitor is adapted to generate characteristic threads for metrology tools used to measure characteristics of semiconductor wafers in the process flow.

21. (Original) The manufacturing system of claim 17, wherein the drift monitor is adapted to generate characteristic threads based on incoming characteristics of semiconductor wafers in the process flow.

22. (Original) The manufacturing system of claim 17, wherein the drift monitor is adapted to generate characteristic threads based on operating recipe parameters used for processing semiconductor wafers in the process flow.

23. (Currently Amended) A manufacturing system, comprising:
means for processing a plurality of manufactured items in a process flow;
means for storing a set of production environment data associated with each of the
manufactured items;
means for identifying manufactured items associated with a process drift;
means for generating a plurality of characteristic threads based on the production
environment data, at least one of the characteristic threads being associated with
other than processing tools used in the process flow;
means for comparing the characteristic threads for at least those manufactured items
associated with the process drift; and
means for determining at least one potential cause for the process drift based on the
comparison of the characteristic threads.

*f2
cmx*

24. (New) The method of claim 2, wherein comparing the characteristic threads
comprises comparing the characteristic threads in a particular characteristic category for all of
the manufactured items to the characteristic threads in the particular characteristic category for
the manufactured items associated with the process drift.

25. (New) The method of claim 24, further comprising calculating a plurality of
characteristic thread ratios, wherein each characteristic thread ratio comprises the ratio of
manufactured items in the characteristic thread associated with the process drift to a total number
of manufactured items in the characteristic thread.

26. (New) The method of claim 25, wherein determining the at least one potential cause for the process drift comprises identifying a particular characteristic thread ratio in one characteristic category that differs from other characteristics thread ratios in the same characteristic category.

27. (New) The manufacturing system of claim 13, wherein the drift monitor is adapted to compare the characteristic threads in a particular characteristic category for all of the manufactured items to the characteristic threads in the particular characteristic category for the manufactured items associated with the process drift.

*AN X
C M*

28. (New) The manufacturing system of claim 27, wherein the drift monitor is adapted to calculate a plurality of characteristic thread ratios, wherein each characteristic thread ratio comprises the ratio of manufactured items in the characteristic thread associated with the process drift to a total number of manufactured items in the characteristic thread.

29. (New) The manufacturing system of claim 28, wherein the drift monitor is adapted to identify a particular characteristic thread ratio in one characteristic category that differs from other characteristics thread ratios in the same characteristic category as the at least one potential cause for the process drift.

30. (New) The method of claim 3, wherein processing the plurality of manufactured items in the process flow comprises processing a plurality of semiconductor wafers in a semiconductor device manufacturing process flow, and wherein generating the plurality of

A2
and

characteristic threads based on the production environment data comprises generating characteristic threads for at least one of processing tools in the process flow, metrology tools used to measure characteristics of semiconductor wafers in the process flow, incoming characteristics of semiconductor wafers in the process flow, and operating recipe parameters used for processing semiconductor wafers in the process flow.